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AS PER LATEST CBSE CURRICULUM 2024-25

Chapter 4: Linear Equation In Two Variables

Concepts Covered:

INTRODUCTION TO LINEAR EQUATIONS IN TWO VARIABLES

Definition

An equation is said to be linear equation in two variables if it is written in the form of ax + by + c = 0, where a, b & c are real numbers and the coefficients of x and y, i.e. a and b respectively, are not equal to zero. For example, 10x + 4y = 3 and -x + 5y = 2 are linear equations in two variables.

Linear Equation in One Variable:

The equation with one variable in it is known as a Linear Equation in One Variable.

The general form is $px + q = s$,

where p, q and s are real numbers and $p \neq 0$.

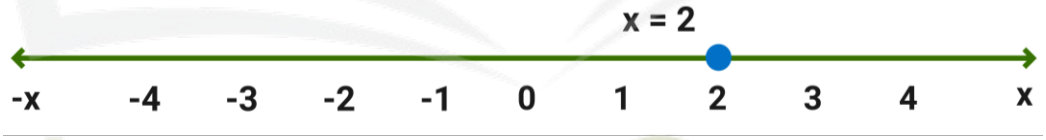
Examples: x + 5 = 10 & y – 3 = 19

These are called Linear Equations in One Variable because the highest degree of the variable is one.

Graph of the Linear Equation in One Variable

We can mark the point of the linear equation in one variable on the number line.

x = 2 can be marked on the number line as follows:

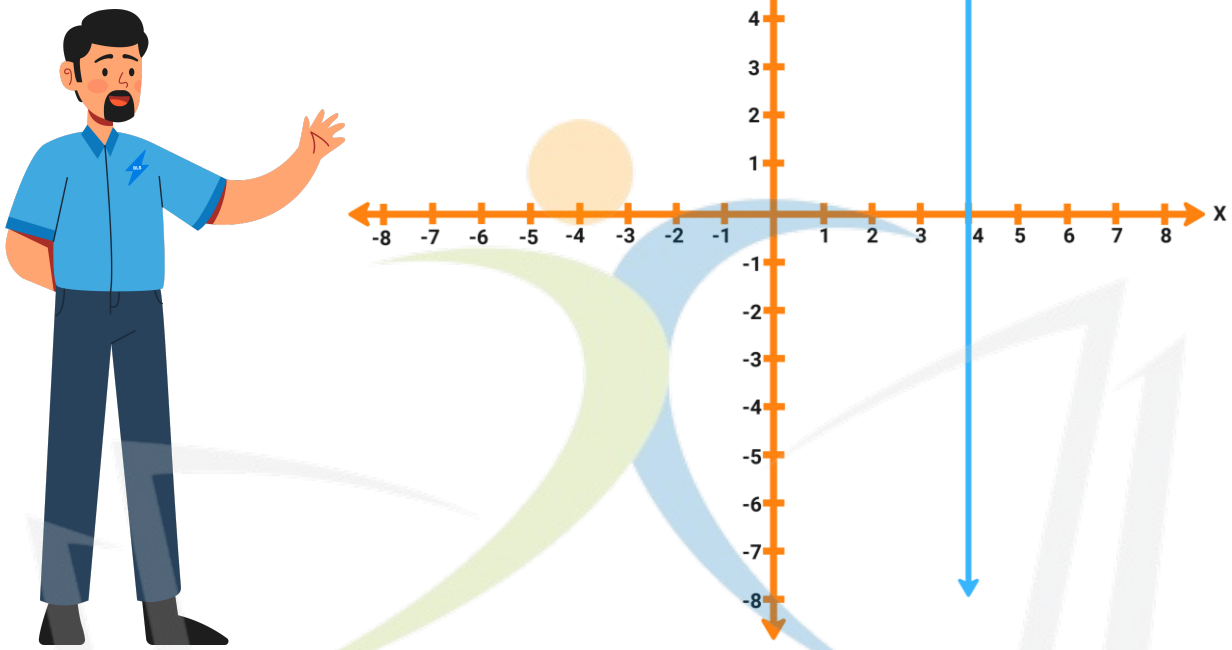


Example: 2x = 8

Solution:

Here, $x = \frac{8}{2} = 4$ (Unique solution)

If we plot solution of this equation on the graph we get a straight line.



Linear Equation in Two Variables

An equation with two variables is known as a Linear Equation in Two Variables. The general form of the linear equation in two variables is ax + by + c = 0

where a and b are coefficients and c is the constant. $a \neq 0$ and $b \neq 0$.

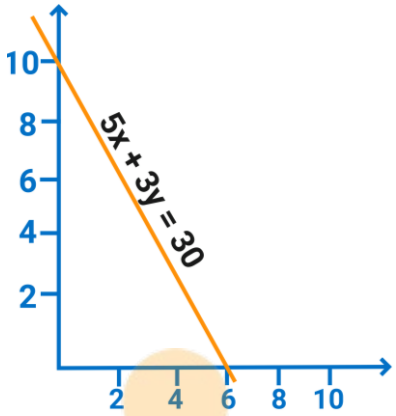
Example: 6x + 2y + 5 = 0, etc.

Solution of Linear Equations in Two Variables

The solution of linear equations in two variables, ax + by = c, is a particular point in the graph, such that when x-coordinate is multiplied by a and y-coordinate is multiplied by b, then the sum of these two values will be equal to c.

Example: In order to find the solution of Linear equation in 2 variables, two equations should be known to us.

Consider for Example: 5x + 3y = 30



The above equation has two variables namely x and y.

Graphically this equation can be represented by substituting the variables to zero.

The value of x when y = 0 is

5x + 3(0) = 30

⇒ x = 6

and the value of y when x = 0 is,

5 (0) + 3y = 30

⇒ y = 10

Unique Solution

For the given linear equations in two variables, the solution will be unique for both the equations, if and only if they intersect at a single point.

The condition to get the unique solution for the given linear equations is, the slope of the line formed by the two equations, respectively, should not be equal.

Consider, m_1 and m_2 are two slopes of equations of two lines in two variables. So, if the equations have a unique solution, then:

$m_1 \neq m_2$

No Solution

If the two linear equations have equal slope value, then the equations will have no solutions.

$m_1 = m_2$

This is because the lines are parallel to each other and do not intersect.

LINEAR EQUATIONS

Definition

Any equation which can be put in the form ax + by + c = 0, where a, b and c are real numbers and a and b are not both zero is called a linear equation in two variables.

The solution of a linear equation is not affected when:

The same number is added to (or subtracted from) both the sides of the equation.

You multiply or divide both the sides of the equation by the same non-zero number.

Forms of Linear Equation

There are three major forms of linear equations: point-slope form, standard form, and slope-intercept form.

There are three main forms of linear equations.

Standard form

This is the standard form of linear equations in two variables:

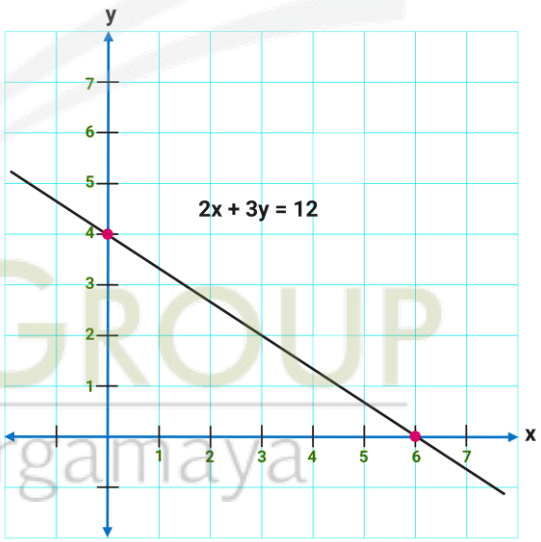
ax + by = c

Usually in this form a, b, and c are all integers.

Finding features and graph from standard equation

Consider, for example, the equation 2x + 3y = 12. If we set x = 0, we get the equation 3y = 12, and we can quickly tell that y = 4, which means the y- intercept is (0, 4).

In a similar way, we can set y = 0 to get 2x = 12 and find that the x-intercept is (6, 0). Now we can graph the line:



Slope-intercept form

Slope-intercept is a specific form of linear equations in two variables:

Y = mx + b

When an equation is written in this form, m gives the slope of the line and b gives its y-intercept.

Example 1: Equation from slope and intercept.

Solution:

Suppose we want to find the equation of the line whose slope is −1 and y-intercept is (0, 5) Well, we simply plug m = −1 and b = 5 into slope-intercept form!

y = -1x + 5

Example 2: Equation from two points Suppose we want to find the line that passes through the points (0, 4) and (3, -1). First, we notice that (0, -4) is the y-intercept. Second, we use the two points to find the slope:

Solution:

$$\text{Slope} = \frac{-1-(-4)}{3-0}$$

$$= \frac{3}{3} = 1$$

Now we can write the equation in slope-intercept:

y = 1x - 4

Point-slope form:

Point-slope is a specific form of linear equations in two variables:

y – b = m (x - a)

When an equation is written in this form, m given the slope of the line and (a, b) is a point the line passes through.

Example 1: Equation from slope and point Suppose we want to find the equation of the line that passes through (1, 5) and whose slope is -2. Well, we simply plug m = -2, a = 1, and b = 5 into point-slope form!

y – 5 = -2(x - 1)

Example 2: Equation from two points Suppose we want to find the line that passes through the points (1, 4) and (6, 19). First, we use the two points to find the slope:

Solution:

$$\text{Slope} = \frac{19-4}{6-1} = \frac{15}{5} = 3$$

Now we use one of the points, let's take (1, 4), and write the equation in point- slope:

y – 4 = 3(x - 1)

SOLUTION OF A LINEAR EQUATION

A linear equation is an equation in which the highest power of the variable is 1. It can be represented in the form "ax + b = 0," where 'a' and 'b' are constants, and 'x' is the variable. The goal is to determine the value(s) of 'x' that make the equation true.

To solve a linear equation, we perform certain operations to isolate the variable on one side of the equation. The key idea is to perform the same operation on both sides of the equation, maintaining the equality. The operations we commonly use include addition, subtraction, multiplication, and division.

Here are the steps to solve a linear equation:

- Simplify the equation, if necessary, by combining like terms.
- Move the constant term (b) to the other side of the equation by performing the opposite operation. For example, if the constant term is added, subtract it from both sides. If it is subtracted, add it to both sides.
- If there is a coefficient (a) multiplying the variable, divide both sides by that coefficient to isolate the variable.
- After simplifying, you should obtain an equation in the form 'x = value' or 'value = x'. This represents the solution(s) to the linear equation.

It's important to remember that while performing operations on an equation, maintaining the equality is crucial. If you perform an operation on one side, you must do the same operation on the other side to keep the equation balanced.

Once you find the solution(s) to a linear equation, you can check your answer by substituting the values of 'x' back into the original equation to ensure that both sides of the equation are equal.

Solving linear equations is a fundamental concept in mathematics and is used in various real-life applications, such as solving problems related to distance, time, speed, cost, and more.

Example 1: Solve the equation 3x + 5 = 14.

Solution:

Step 1: Simplify the equation.

3x + 5 = 14

Step 2: Move the constant term to the other side.

3x = 14 - 5 = 9

Step 3: Isolate the variable by dividing both sides by the coefficient of 'x', which is 3.

$x = \frac{9}{3} = 3$

Therefore, the solution to the equation 3x + 5 = 14 is x = 3.

Example 2: Solve the equation 2(x - 4) = 3(2x + 1).

Solution:

Step 1: Simplify the equation.

2x - 8 = 6x + 3

Step 2: Move the variable terms to one side and the constant terms to the other side.

2x - 6x = 3 + 8

-4x = 11

Step 3: Isolate the variable by dividing both sides by the coefficient of 'x', which is -4.

$x = \frac{11}{-4}$

$x = -\frac{11}{4}$ or -2.75 (in decimal form)

Therefore, the solution to the equation:

$2(x - 4) = 3(2x + 1)$ is $x = -\frac{11}{4}$ or $x = -2.75$.

Solution of a Linear Equation:

- There is only one solution in the linear equation in one variable but there are infinitely many solutions in the linear equation in two variables.
- As there are two variables, the solution will be in the form of an ordered pair, i.e. (x, y).
- The pair which satisfies the equation is the solution of that particular equation.

Example: Find the solution for the equation 2x + y = 7.

Solution: To calculate the solution of the given equation we will take x = 0

2(0) + y = 7

y = 7

Hence, one solution is (0, 7).

To find another solution we will take y = 0

2x + 0 = 7

x = 3.5

So, another solution is (3.5, 0).

GRAPH OF A LINEAR EQUATION IN TWO VARIABLES

Definition

We know that linear equation in two variables x and y is represented by ax + by + c = 0. It has infinitely many solutions. If we plot these solutions on the graph paper, we see that each solution represents a point and when we join these points, we get a straight line. And such a straight line is called the graph of the linear equation.

Thus, we can conclude that (1) Every point on the line satisfies the equation of the line. (2) Every point (a, b) on the line gives a solution x = a, y = b of Linear equation. (3) Any point, which does not lie on the line, is not a solution of linear Equations.

Method to Draw the Graph of a Linear Equation in Two Variables

Step I: Let the linear equation in two variables be ax + by + c = 0

Step II: Write the linear equation and express y in term of x to obtain y

ax + by + c = 0

by = -ax - c

by = -(ax + c)

$$y = \frac{-ax + c}{b} \ldots (i)$$

Step III: Put different values of x in equation (i) and find the corresponding value of y from this we obtain two solutions as (x_1, y_1), (x_2, y_2), (x_3, y_3) ....

Step IV: Plot the above points on the graph paper obtain from equation (i). Then join these points $(x_1.y_1)$, $(x_2.y_2)$, $(x_3.y_3)$ Thus, we get a straight line.

The line so obtained is the graph of the equation ax + by + c = 0

Example: Draw the graph of the equation y - x = 3

We have,

y - x = 3

y = x + 3

When x = 1, we have y = 1 + 3 = 4

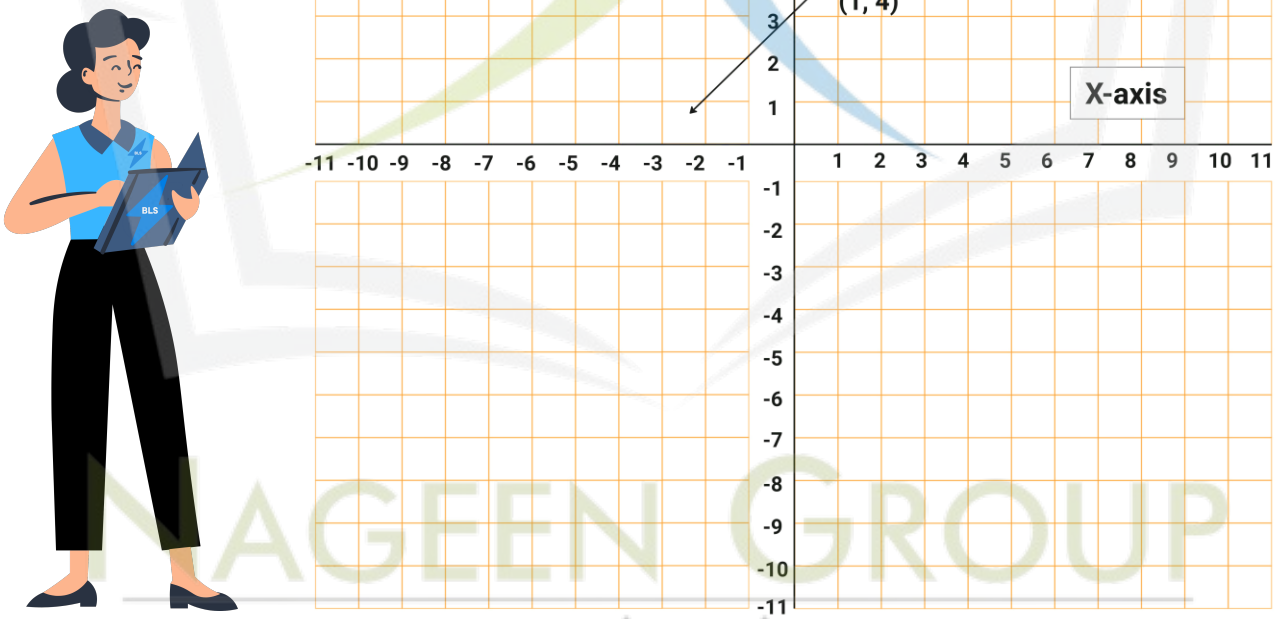
When x = 2, we have y = 2 + 3 = 5

When x = 3, we have y = 3 + 3 = 6

Thus, we have the following table to draw the graph.

x	1	2	3
y	4	5	6

Plotting the points (1, 4), (2, 5) and (3, 6) on the graph paper and joining these points. We obtain the graph of the line represented by the given equation as shown below:



EQUATIONS OF LINES PARALLEL TO X-AXIS AND Y-AXIS

Definition

In two-dimensional coordinate geometry, the coordinate plane is made up of two axes, namely x-axis and y-axis. The horizontal line in the cartesian plane is called x-axis and the vertical line in the cartesian plane is called y-axis.

Equations of Line Parallel to x-axis:

We know that the equation of x-axis is y = 0.

Thus, the equation of line parallel to the x-axis is given by the equation: y = k.

Where "k" is a constant value.

The above equation is considered as the generalized form of line equation parallel to the x-axis.

We can also say that "k" is a real number, and it is the distance from the x-axis to the line y = k.

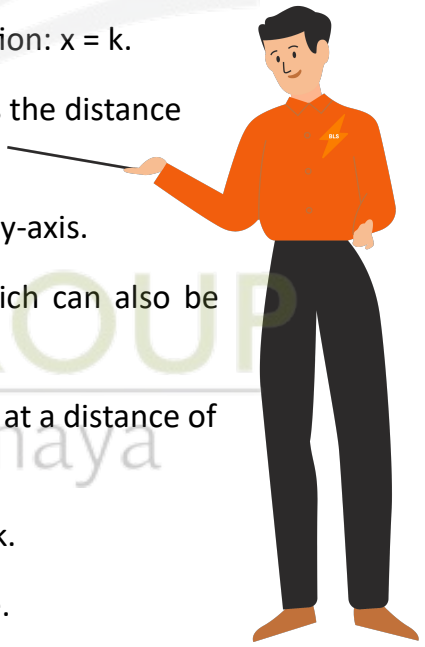
An example of a line equation parallel to the x-axis is y = 5. It can also be written as y - 5 = 0.

Equations of Line Parallel to y-axis:

The general form of the equation of y-axis is x = 0.

Hence, the equation of line parallel to the y-axis is given by the equation: x = k.

Where "k" is a constant value, which is a real number that represents the distance from the y-axis to the line x = k.



The equation x = k is the generalized form of line equation parallel to y-axis.

An example of an equation of line parallel to the y-axis x = 7, which can also be represented as x – 7 = 0.

Example 1: Determine the line equation which is parallel to the x-axis at a distance of 5 units above the x-axis.

Solution: The equation of the straight line parallel to the x-axis is y = k.

Since the distance is 5 units above the x-axis, the value of k is positive.

Thus, the equation of the straight line parallel to the x-axis at a distance of 5 units above the x-axis is y = 5.

The above equation can also be written as y - 5 = 0.

Example 2: Find the line equation which is parallel to the y-axis at a distance of 10 units right to the y-axis.

Solution: The equation of the straight line parallel to the y-axis is x = k.

Since the distance is 10 units right to the y-axis, the value of k is positive.

Therefore, the equation of the straight line parallel to the y-axis at a distance of 10 units right to the y-axis is x = 10.

The line equation x = 10 can also be written as x - 10 = 0.

04

LINEAR EQUATION IN TWO VARIABLES

MIND MAP

Where

Equation of the form ax + by + c = 0

Example → **x, y - variables**

a , b c - constants
$(a,b) \neq (0,0)$

Linear equation

Graphical Representation

Step 1: Write the equation in two variables, if not present

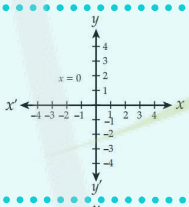
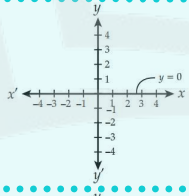
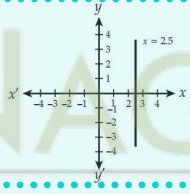
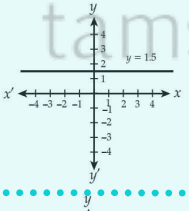
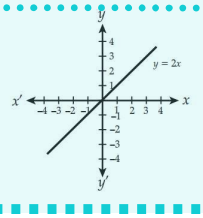
Step 2: Reduce it to one variable by putting an arbitrary value of any variable, to find a pair of solution.

Step 3: Repeat step 2 for another arbitrary value of variable to find another pair of solution.

It can have one, no or infinitely many solutions.

Linear Equations in Two Variables

Steps to find solution

Equation	Interpretation	Graphical representation
$x = 0$	Equation of y-axis	
$y = 0$	Equation of x-axis	
$x = K$	Straight line parallel to y-axis	
$y = K$	Straight line parallel to x-axis	
$y = mx$	Line passing through origin	

Example - Graph of Linear Equation

Linear equation: $2x + 3y + 12$

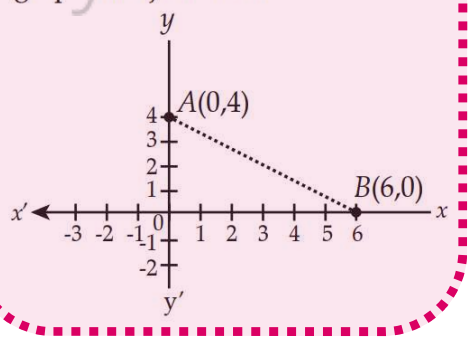
Step 1: From equation, we get

$$y = \frac{12 - 2x}{3}$$

Step 2: Put arbitrary value of x, y.

x	0	0
y	4	6

Step 3: Plot (0,4) and (6,0) on the graph and join them.



Linear Equations in Two Variables

DPP-01

[Topic: Linear Equations]

Very Short Answer Type Questions

1. Express the following linear equations in the form $ax + by + c = 0$ and indicate the values of a, b and c in each case.
   (i) $x + y = 2.5$
   (ii) $2x = -5y$
   (iii) $y - 3 = 0$
   (iv) $2y + 3 = 0$
   (v) $7 = 9x$
   (vi) $-2x + 3y = 6$
2. Write each of the following as an equation in two variables.
   (i) $3x = 5$
   (ii) $y = 2$
   (iii) $x = \frac{-3}{2}y$
   (iv) $5x = \frac{9}{2}$
   (v) $-\frac{1}{2} = 2x$
3. Express the given equation as a linear equation in two variables in standard form: $\sqrt{3}y = 2x$
4. Express the following statements in the form of a linear equation in two variables.
   (i) The cost of a half dozen eggs are the same as the cost of one packet of bread.
   (ii) Riya got $\frac{3}{4}$ of the cake, Tanya got.
   (iii) The cost of a key ring is ₹5 less than the twice of the cost of a pen.
   (iv) The sum of the ordinate and abscissa of a point is 8.

Short Answer Type Question

5. The number of sincere students (x) in a class is two more than twice the number of careless students (y). Write a linear equation in two variables for this situation. How does sincerity help and carelessness harm a student?

Linear Equations in Two Variables

DPP-02

[Topic: Solution of a Linear Equation]

Very Short Answer Type Questions

1. Find a solution of the equation $-5x + 2y = 14$.
2. Is $x = 5, y = -2$ a solution of the linear equation $2x - y = 12$?
3. What is a solution of linear equation $y = 2x$ if $x = \frac{3}{2}$?
4. A linear equation has solutions $(-5,5)$, $(0,0)$ and $(5,-5)$. Write the linear equation.
5. Find the solution of the linear equation $2x + 0y = 9$.

Short Answer Type Questions-I

6. For what value of $k, x = 2$ and $y = -1$ is a solution of $x + 3y - k = 0$.
7. Express y in terms of x, given that $2x - 5y = 7$. Check whether the point $(-3,-2)$ is on the given line.
8. For what value of c, the linear equation $2x + cy = 8$ has equal values of x and y as its solution?
9. Find the value of k if the line represented by the equation $2x - ky = 9$ passes through the point $(-1,-1)$.
10. If the point $(2,1)$ lies on the line $5x - 2y = 2k$, find ' k '. Also find one more solution for the given equation.
11. If $(2,0)$ is a solution of the linear equation $2x + 3y = k$, then find the value of k ?
12. If the point $(3,4)$ lies on the graph of $3x = ay + 7$, then find the value of a.

Short Answer Type Questions-II

13. Find m, if point $(7,-3)$ lies on the equation $y - \frac{3}{7} = m\left(x - \frac{2}{7}\right)$
14. Find any three solutions for the equation $15x - 2y = 7$.
15. When 5 times the larger of the two numbers is divided by the smaller, the quotient and remainder are 2 and 9, respectively. Form a linear equation in two variables for above and give its two solutions.
[Imp.]
16. If $x = 2, y = -1$ is a solution of the equation $ax - y = 5$, find the value of a. Also find two more solutions of the equation.
17. If $x = 2k - 1$ and $y = k$ is a solution of the equation $3x - 5y - 7 = 0$, find the value of k.
18. If $x = 2\alpha + 1$ and $y = \alpha - 1$ is a solution of the equation $2x - 3y + 5 = 0$, find the value of α.

19. One of the solutions of the equation $8x - ay + a^2 = 0$ is given by $x = 1$ and $y = 6$. Find the value of a.
20. Solve for x: $\frac{3}{x-1} + \frac{1}{x+1} = \frac{4}{x}$, where $x \neq 0, x \neq 1, x \neq -1$.
21. Solve for x: $(5x + 1)(x + 3) - 8 = 5(x + 1)(x + 2)$

Long Answer Type Questions

22. The linear equation that converts Fahrenheit (F) to Celsius (C) is given by the relation:

$$C = \frac{5\,F - 160}{9}$$

(i) If the temperature is $86°F$ what is the temperature in Celsius?

(ii) If the temperature is $35°C$, what is the temperature in Fahrenheit?

(iii) If the temperature is $0°C$, what is the temperature in Fahrenheit and if the temperature is $0°F$, what is the temperature in Celsius?

(iv) What is the numerical value of the temperature which is same in both the scales?

23. Solve: $\frac{4}{5}\left(x + \frac{5}{6}\right) - \frac{2}{3}\left(x - \frac{1}{4}\right) = 1\frac{1}{6}$
24. ₹ 27 is in the form of 50 paise, 25 paise and 20 paise coins. The number of 25 paise coins is double the number of 20 paise coins but half the number of 50 paise coins. Find the number of coins of each type.
25. A student studying in a university covers his expenditure on daily needs and tuition fee by driving a taxi on rent in the city. The taxi fare in the city is as follows:
For the first kilometre the fare is ₹40 and for the subsequent distance it is ₹20 per kilometre.

(i) Write a linear equation for the given information by taking different variables for the distance covered and total fare.

(ii) Which mathematical concept is used in above problem?

(iii) Which value is depicted by the student by driving a taxi?

26. On her birthday, Natasha donated 4 toffees each to children of an orphanage and 20 chocolates to adults working there. Taking the total items distributed as x and the number of children y, write a linear equation in two variables for the above situation.

(i) Write the equation in standard form.

(ii) How many children are there if total 80 items were distributed?

(iii) What values does Natasha possess?

Linear Equations in Two Variables

DPP-03

[Topic: Graph of a Linear Equation in Two Variables]

Very Short Answer Type Questions

1. Draw the graph of each of the following linear equations in two variables.
   (i) $x + y = 6$
   (ii) $y = 2x$
   (iii) $x - y = 1$
   (iv) $4 = 2x - y$
2. Check whether the graph of the following linear equations passes through origin or not?
   (i) $y = -x$
   (ii) $y = -k + x$
   (iii) $0.5y = x$
3. Line $2x + y = 3$ passes through origin. Is this statement true or false?
4. Write three possible linear equations which can pass through point $(3, -2)$. How many such equations are possible?

Short Answer Type Questions-I

5. Find the coordinates of the points where the line $2x - y = 3$ meets both the axes.
6. Find the coordinates of a point where the linear equation $3x - 4y = 11$ meets the x-axis.
7. Find the coordinates of a point where the linear equation $\frac{2}{3}y = 4x - 7$ meets the y-axis.

Short Answer Type Questions-II

8. Draw the graph of linear equation whose solutions are represented by the points having the sum of the coordinates as 5 units.
9. Draw the graph of the equation $3x + 4y = 12$ and find the coordinates of the point of intersection of the equation with the coordinate axes.
10. Draw the graph of two lines, whose equations are $3x - 2y = 4$ and $x + y - 3 = 0$ on the same graph paper and find the coordinates of the point where two lines intersect.
11. Draw the graph of $x + 2y = 6$ and find the points where the line cuts the x-axis and y-axis.
12. Draw the graph of the equation $2x + 3y = 6$. From the graph find the value of x, when $y = 4$.
13. Draw the graph of the equation $3x + 2y = 5$. From the graph find the value of x, when $y = 1$.

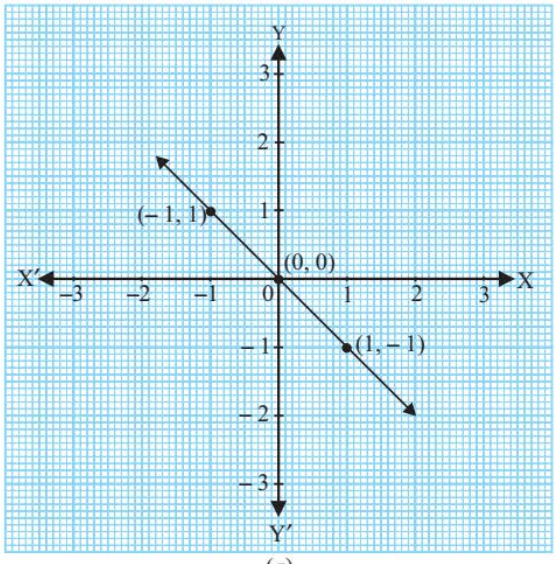
Long Answer Type Questions

14. Draw the graph of $2x + 3y = 1$ and verify from the graph whether $x = 5, y = -3$ is a solution or not. Give reason in support of your answer.
15. Draw the graphs of the linear equations $4x - 3y + 4 = 0$ and $4x + 3y - 20 = 0$, on the same graph paper. Find the area bounded by these lines and x-axis.
16. Draw the graphs of the following linear equations on the same graph paper

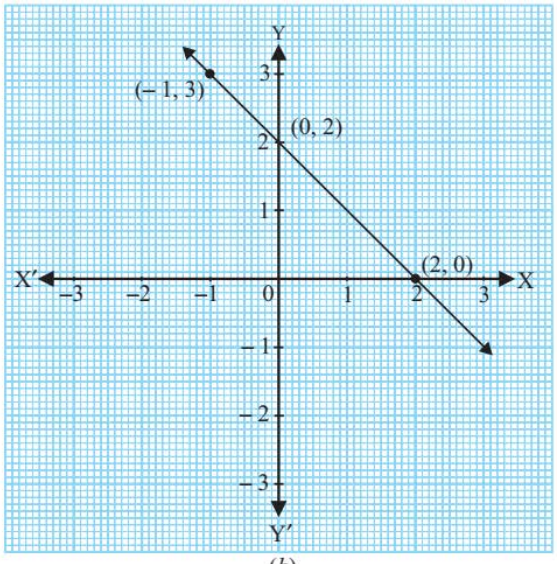
$$\begin{aligned} 2x + 3y &= 12 \\ x - y &= 1 \end{aligned}$$

Find the coordinates of the vertices of the triangle formed by the two straight lines and the y-axis. Hence, find the area of triangle thus formed.

17. Shade the triangle formed by the graphs of $2x - y = 4, x + y = 2$ and the y-axis. Find the coordinates of vertices of the triangle. Also, find its area.
18. If x is the number of hours of a labour on work and y is his wages in rupees, then $y = 4x + 3$. Draw the work wages graph of this equation. From the graph, find the wages of a labour who puts in 4 hours of work.
19. Perimeter of a rectangle is 22 m. Write the given information in the form of a linear equation in two variables. Also represent it graphically,
20. From the choices given below, choose the equations whose graphs are given in figure (a) and figure (b).



(a)



(b)

For figure (a)

(i) $y = x$

(ii) $x + y = 0$

(iii) $y = 2x$

(iv) $2 + 3y = 7x$

For figure (b)

(i) $y = x + 2$

(ii) $y = x - 2$
(iii) $y = -x + 2$
(iv) $x + 2y = 6$

21. Yamini and Fatima, two students of class IX, together contributed ₹100 towards Prime-Minister's. Relief Fund to help the earthquake victims. Write a linear equation with this data satisfied. Draw the graph of the same. What value is being reflected here by the students?
22. The food charges in a hostel are as follows. For the first day, the charges are ₹100 and for the subsequent days it is ₹50 per day. Taking the number of days as x and total charges as ₹y, write a linear equation for this information and draw its graph.
23. The taxi fare in a city is as follows. For the first kilometre, the fare is ₹8, for the subsequent distance it is ₹5 per km. Taking the distance covered as x km and total fare as ₹y, write a linear equation for this information and draw its graph.

Linear Equations in Two Variables

DPP-04

[Topic: Equation of Lines Parallel to the x-axis and y-axis]

Very Short Answer Type Questions

1. Find the general coordinate of any point on the x-axis.
2. Does the equation $x = -4$ represent the line parallel to y-axis?
3. What is the distance between the graphs of the equations $x = -3$ and $x = 2$?
4. What is the distance between the graphs of the equations $y = 1$ and $y = -4$.

Short Answer Type Questions

5. Give the geometric representation of $y = 3$ as an equation;
   (i) in one variable
   (ii) in two variables
6. Give the geometric representation of $2x + 9 = 0$ as an equation:
   (i) in one variable
   (ii) in two variables
7. Solve the equation $5x - 2 = 3x - 8$ and represent the solution:
   (i) on the number line
   (ii) on the Cartesian plane
8. Solve the equation $3y - 2 = 2y + 3$ and represent the solution:
   (i) on the number line
   (ii) on the Cartesian plane
9. Write the equation of the line that is parallel to x-axis and passes through the point $(3,5)$.
10. Write the equation of the line which is parallel to y-axis and passes through the point $(-1,2)$.

(Practice Sheet)

1 **What is the general form of a linear equation in two variables?**

A. $ax + by = 0$ **B.** $px + q = s$

C. $cx + dy = e$ **D.** $fx + gy = h$

2 **Which of the following is an example of a linear equation in one variable?**

A. $3x + 2y = 7$ **B.** $x^2 - 4 = 0$

C. $y - 5 = 2x$ **D.** $2y = 6x - 3$

3 **How is the solution of a linear equation in two variables represented graphically?**

A. As a point **B.** As a line

C. As an area **D.** As a curve

4 **When do two linear equations in two variables have a unique solution?**

A. When they are parallel **B.** When they intersect at a single point

C. When their slopes are equal **D.** When their y-intercepts are the same

5 **What happens if the slopes of two linear equations in two variables are equal?**

A. They have a unique solution **B.** They are parallel lines

C. They intersect at multiple points **D.** They have no solution

6 Given the linear equations $3x + 2y = 8$ and $2x - y = 4$, find if they have a unique solution.

7 How do you graph an equation such as $4x + 3y = 12$?

8 How do you solve the system of equations $2x - 5y = 10$ and $4x - 10y = 20$?

9 Given two linear equations, calculate the slopes and check if they have a unique solution.

10 Aftab tells his daughter, “Seven years ago, I was seven times as old as you were then. Also, three years from now, I shall be three times as old as you will be.” (Isn’t this interesting?) Represent this situation algebraically.

(Practice Sheet)

1 **What is the standard form of a linear equation in two variables?**

A. ax - by = c
B. ax + by = 0
C. ax + by = c
D. ax - by = 0

2 **The solution of a linear equation is not affected when.**

A. The same number is subtracted from both sides
B. Both sides are multiplied by the same non-zero number
C. A constant is added to one side
D. Only variable terms are modified

3 **Which form of linear equation provides the slope of the line and y-intercept directly?**

A. Standard form
B. Point-slope form
C. Slope-intercept form
D. Intercept form

4 **In the standard form equation 2x + 3y = 12, what are the x and y intercepts, respectively?**

A. (0, 6) and (4, 0)
B. (0, 4) and (6, 0)
C. (0, 12) and (3, 0)
D. (0, 3) and (4, 0)

5 **What is the slope of a line represented by the point-slope form equation y - 5 = -2(x - 1)?**

A. -2
B. 2
C. 1
D. -1

6 Find the slope-intercept form of the line with a slope of 3 and a y-intercept of (0, 7).

7 Determine the point-slope form of the line passing through (2, -3) and (5, 6).

8 How do you write the equation of a line with a slope of $-\frac{1}{2}$ and passing through the point (4, 5)

9 What are the number of solutions of linear equation 2x + 4y = 12?

10 Find the equation of the line through (−4, 7) with slope −5.

(Practice Sheet)

1 **In a linear equation, the highest power of the variable is:**

A. 1 **B.** 2

C. 0 **D.** Variable power is not defined.

2 **What operation is performed on both sides of a linear equation to move the constant term to the other side?**

A. Addition **B.** Subtraction

C. Multiplication **D.** Division

3 **Why is it important to check the solution of a linear equation by substituting it back into the original equation?**

A. It is a required step in the process. **B.** To make sure both sides of the equation are equal.

C. To simplify the equation further. **D.** It is not necessary.

4 **In a linear equation, how is the variable isolated?**

A. By combining like terms **B.** By moving the constant term to the other side

C. By dividing both sides by the coefficient of the variable **D.** All of the above

5 **How many solutions does a linear equation in one variable have?**

A. Infinitely many **B.** Two

C. Only one **D.** None

6 Solve the linear equation $4x - 6 = 2$.

7 Solve the equation $3(y + 2) = 2(4 - y)$.

8 Find the solution for the equation $5x + 2y = 10$.

9 Solve the equation $2x - 3 = x - 2$.

10 Solve the equation $2(3x - 1) = 4x + 2$ and check the validity of the solution.

(Practice Sheet)

1 **What does the graph of a linear equation in two variables represent?**

A. A circle **B.** A parabola

C. A straight line **D.** A curve

2 **What method is used to draw the graph of a linear equation in two variables?**

A. Substitution **B.** Elimination

C. Graphical representation **D.** Matrix multiplication

3 **What is the slope-intercept form of the equation y - x = 3?**

A. $y = 3x + 1$ **B.** $y = x + 3$

C. $y = x – 3$ **D.** $y = -x + 3$

4 **In the method to draw the graph of a linear equation, what do the points (x_1, y_1), (x_2, y_2), (x_3, y_3), ... represent?**

A. Solutions of the equation **B.** The x-axis intercepts

C. Random coordinates **D.** Maximum and minimum values

5 **What does it mean if a point does not lie on the graph of a linear equation?**

A. It is a valid solution. **B.** It is not a solution of the equation.

C. It is an intercept point. **D.** It represents the origin.

6 Draw the graph of the pair of equations $2x + y = 4$ and $2x – y = 4$. Write the vertices of the triangle formed by these lines and the y - axis, find the area of this triangle?

7 How do you graph the equation $3y – 2x = 6$ on the coordinate plane?

8 How do you graph $y = 2x – 1$ by plotting points?

9 Draw the graph of the equation $3x – 4y = 12$. Use the graph drawn to find:
(i) y_1, the value of y, when $x = 4$.
(ii) y_2, the value of y, when $x = 0$.

10 If the point (2, -2) lies on the graph of linear equation, $5x + ky = 4$, find the value of k.

(Practice Sheet)

1 **What is the equation of a line parallel to the x-axis at a distance of 3 units below the x-axis?**

A. y = 3 **B.** y = -3

C. y - 3 = 0 **D.** y + 3 = 0

2 **What is the equation of a line parallel to the y-axis at a distance of 7 units to the left of the y-axis?**

A. x = -7 **B.** x = 7

C. x - 7 = 0 **D.** x + 7 = 0

3 **In the equation y = 4, what does the value '4' represent?**

A. Distance below the x-axis **B.** Distance above the x-axis

C. Distance to the left of the y-axis **D.** Distance to the right of the y-axis

4 **What is the generalized form of the equation for a line parallel to the y-axis?**

A. y = k **B.** x = k

C. y - k = 0 **D.** x - k = 0

5 **If a line is parallel to the x-axis, what is the form of its equation?**

A. x = k **B.** y = k

C. x - k = 0 **D.** y - k = 0

6 Determine the equation of a line parallel to the x-axis at a distance of 8 units below the x-axis.

7 Find the equation for a line parallel to the y-axis at a distance of 12 units to the right of the y-axis.

8 Analyse the equation y - 6 = 0 and determine the distance from the x-axis.

9 What is the generalized form of the equation for a line parallel to the x-axis?

10 If a line is parallel to the y-axis, what is the appropriate equation form?

EXEMPLAR SOLUTIONS

Chapter 4- Linear Equations In Two Variables

EXERCISE 4.1

Write the correct answer in each of the following:

1. **The linear equation 2x – 5y = 7 has**

A. A unique solution
B. Two solutions
C. Infinitely many solutions
D. No solution

Solution:

C. Infinitely many solutions

Explanation:

Expressing y in terms of x in the equation 2x – 5y = 7, we get,

2x – 5y = 7

– 5y = 7 – 2x

y = (7 – 2x)/– 5

Hence, we can conclude that the value of y will be different for different values of x.

Hence, option C is the correct answer.

2. The equation 2x + 5y = 7 has a unique solution, if x, y are:

A. Natural numbers
B. Positive real numbers
C. Real numbers
D. Rational numbers

Solution:

A. Natural numbers

Explanation:

Consider, 2x + 5y = 7

x	**1**
y	**1**

A. (1, 1) is a solution of 2x + 5y = 7

B. If positive real numbers are chosen, 2x + 5y = 7 will have many solutions.

C. If real numbers are chosen, 2x + 5y = 7 will have infinite solutions.

D. If rational numbers are chosen, 2x + 5y = 7 will have many solutions.

Hence, option A is the correct answer.

3. If (2, 0) is a solution of the linear equation 2x + 3y = k, then the value of k is

A. 4
B. 6
C. 5
D. 2

Solution:

A. 4

Explanation:

We know that,

(2, 0) = (x, y)

Substituting values of x and y in the above equation, we get

$2\times2 + 3\times0 = k$
$k = 4$
Hence, option A is the correct answer.

4. Any solution of the linear equation 2x + 0y + 9 = 0 in two variables is of the form

A. (-9/2 , m)
B. (n, -9/2)
C. (0, -9/2)
D. (– 9, 0)

Solution:

A. (-9/2 , m)
Explanation:
Solving the above equation we get,
$2x = -9$
$x = -9/2$
As the coefficient of y is 0, therefore, y can take any value and will not affect our answer.
A. $x = -9/2$
y = any value
B. $x = n$
C. $x = 0$
D. $x = -9$
Hence, option A is the correct answer.

5. The graph of the linear equation 2x + 3y = 6 cuts the y – axis at the point

A. (2, 0)
B. (0, 3)
C. (3, 0)
D. (0, 2)

Solution:

D. (0, 2)
Let 2x + 3y = 6 cut the y-axis at P. therefore at P x-coordinate = 0.
Substituting x = 0, we get
$2(0) + 3y = 6$
$3y = 6$
$y = 2$
Hence the coordinates are (0, 2).
A. (2, 0) is wrong because it has x = 2
B. (0, 3) is wrong because it has y = 3
C. (3, 0) is wrong because it has x = 3
D. (0, 2) is right because it has x = 0 and y = 2 which is equal to the coordinates (0,2)
Hence, option D is the correct answer.

6. The equation x = 7, in two variables, can be written as

A. 1. x + 1. y = 7
B. 1. x + 0. y = 7

C. 0. x + 1. y = 7
D. 0. x + 0. y = 7

Solution:

B. 1. x + 0. y = 7
A. Simplifying the equation we get x + y = 7
B. Simplifying the equation we get x + 0y = 7 which is equal to x = 7
C. Simplifying the equation we get y = 7
D. simplifying the equation we get 0x + 0y = 7 which is not possible.
Hence, option (B) is the correct answer.

7. Any point on the x – axis is of the form

A. (x, y)
B. (0, y)
C. (x, 0)
D. (x, x)

Solution:

C. (x, 0)
Any point on the x-axis has its ordinate 0.
So, any point on the x-axis if of the form (x, 0).
Hence, option (C) is the correct answer.

8. Any point on the line y = x is of the form

A. (a, a)
B. (0, a)
C. (a, 0)
D. (a, – a)

Solution:

A. (a, a)
Any point on the line y = x will have x and y coordinate same.
So, any point on the line y = x is of the form (a, a).
Hence, option (A) is the correct answer.

9. The equation of x – axis is of the form

A. x = 0
B. y = 0
C. x + y = 0
D. x = y

Solution:

B. y = 0
The equation of x-axis is y = 0, since, x-axis is a parallel to itself at a distance 0 from it.
Hence, option (B) is the correct answer.

EXERCISE 4.2

Write whether the following statements are True or False? Justify your answers:

1. The point (0, 3) lies on the graph of the linear equation $3x + 4y = 12$.

Solution:

True.

Justification:

We have the equation, $3x + 4y = 12$.

Substituting the values of $x = 0$ and $y = 3$ from the point (0, 3) in the equation,

We get,

$3(0) + 4(3) = 12 = RHS$.

Hence, the point (0, 3) lies on the graph of the linear equation $3x + 4y = 12$.

2. The graph of the linear equation $x + 2y = 7$ passes through the point (0, 7).

Solution:

False.

Justification:

We have the equation, $x + 2y = 7$.

Substituting the values of $x = 0$ and $y = 7$ from the point (0, 7) in the equation,

We get,

$0 + 2(7) = 14 \neq RHS$

Hence, the graph of the linear equation $x + 2y = 7$ passes through the point (0, 7).

3. The graph given below represents the linear equation $x + y = 0$.

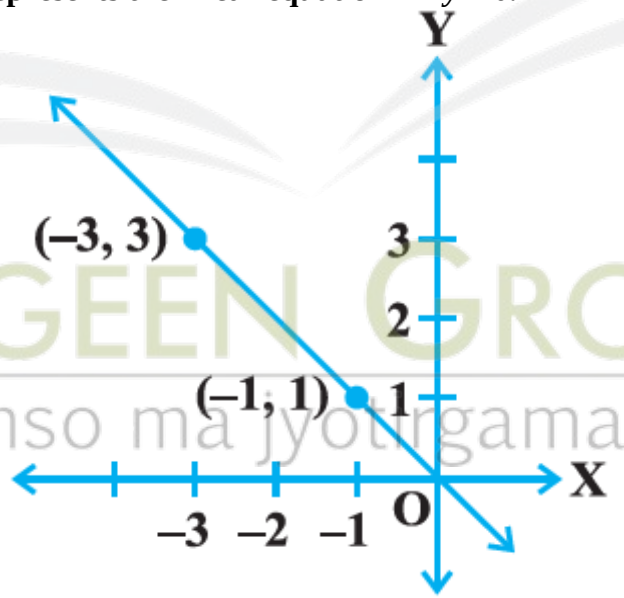


Fig. 4.1

Solution:

True.

Justification:

We have the equation, $x + y = 0$.
$x + y = 0$
$x = – y$
from the graph, we get the points $(– 3, 3)$ and $(– 1, 1)$,
Considering the point $(– 3, 3)$
$x = – 3$ and $y = 3$
Hence, substituting $(– 3, 3)$ in equation,
We get,
$– 3 = 3$ which satisfies the equation $x = – y$
Considering the point $(– 1, 1)$
$x = – 1$ and $y = 1$
Hence, substituting $(– 1, 1)$ in equation,
We get,
$– 1 = 1$ which satisfies the equation $x = – y$
Therefore, the given solution: $(– 3, 3)$ and $(– 1, 1)$ satisfies the given equation $x = – y$.
Hence, the given graph represents the linear equation $x + y = 0$.

EXERCISE 4.3

1. Draw the graphs of linear equations y = x and y = – x on the same Cartesian plane. What do you observe?

Solution:

According to the question,

y = x ------- eq (i)

Values of x and y satisfying the equation=

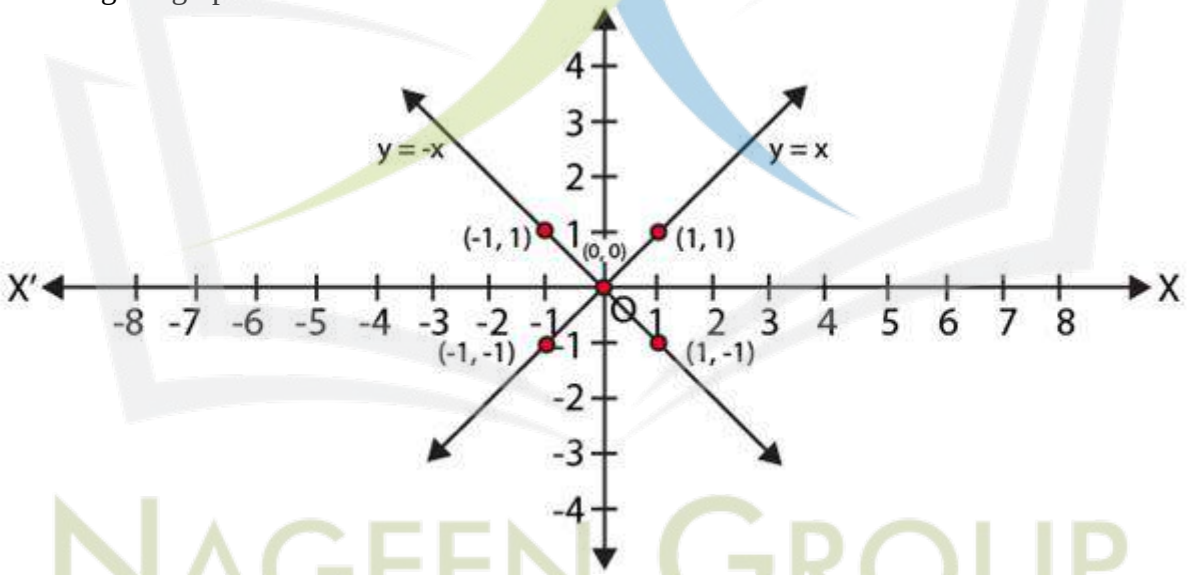
x	– 1	0	1
y	– 1	0	1

y = -x ------- (ii)

Values of x and y satisfying the equation=

x	– 1	0	1
y	1	0	– 1

Plotting the graph:



From the above graph,

We observe that the two lines y = x and y = – x intersect each other at O (0, 0).

2. Determine the point on the graph of the linear equation 2x + 5y = 19 whose ordinate is 1½ times its abscissa.

Solution:

From the question, we have,

2x + 5y = 19 …(i)

According to the question,

Ordinate is 1½ times its abscissa

⇒ y = 1½ x = (3/2) x

Substituting y = (3/2)x in eq. (i)

We get,

2x + 5 (3/2) x = 19
(19/2)x = 19
x = 2
Substituting x = 2 in eq. (i)
We get
2x + 5y = 19
2(2) + 5y = 19
y = (19 – 4)/5 = 3
Hence, we get x =2 and y = 3
Thus, point (2, 3) is the required solution.

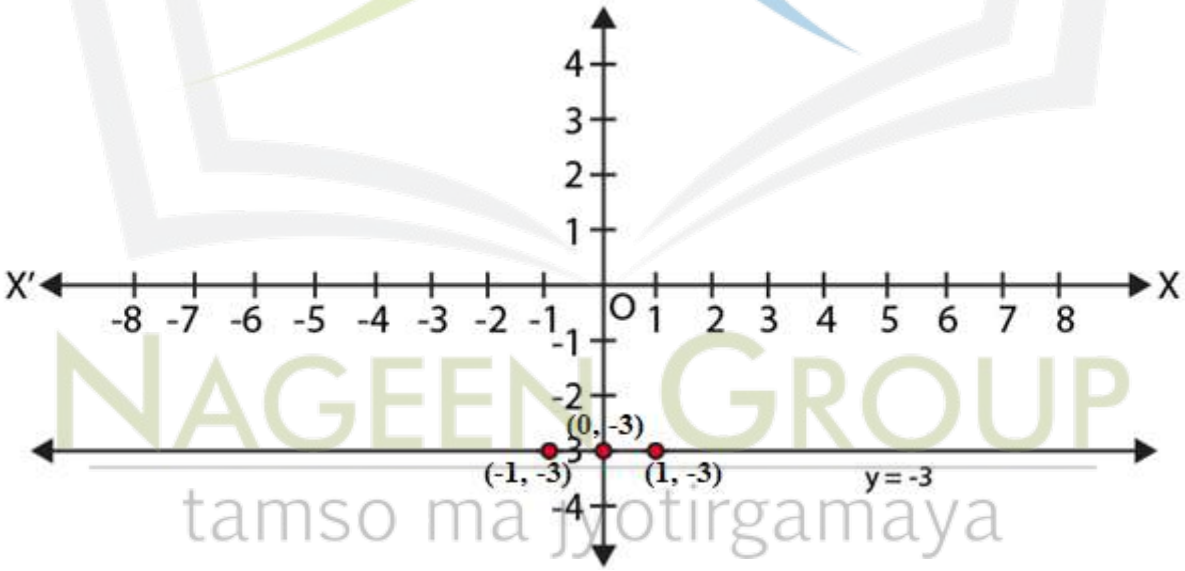
3. Draw the graph of the equation represented by a straight line which is parallel to the x-axis and at 3 units below.

Solution:

According to the question,
We get the linear equation,
y = – 3
Values of x and y satisfying the equation=

x	– 1	0	1
y	– 3	– 3	– 3

Plotting the graph:



4. Draw the graph of the linear equation whose solutions are represented by the points having the sum of the coordinates as 10 units.

Solution:

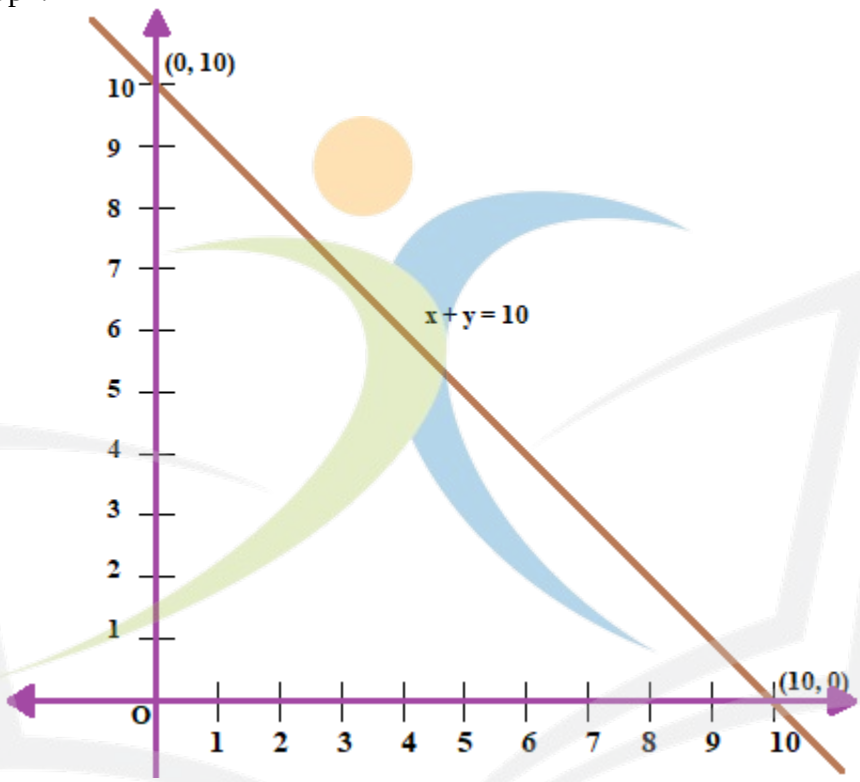
According to the question,
We get the linear equation,
x + y = 10
We get,

x = 10 – y

Values of x and y satisfying the equation=

x	10	5	0
y	0	5	10

Plotting the graph:



5. Write the linear equation such that each point on its graph has an ordinate 3 times its abscissa.

Solution:

According to the question,

A linear equation such that each point on its graph has an ordinate(y) which is 3 times its abscissa(x).

So we get,

⇒ y = 3x.

Hence, y = 3x is the required linear equation.

EXERCISE 4.4

1. Show that the points A (1, 2), B (– 1, – 16) and C (0, – 7) lie on the graph of the linear equation y = 9x – 7.

Solution:

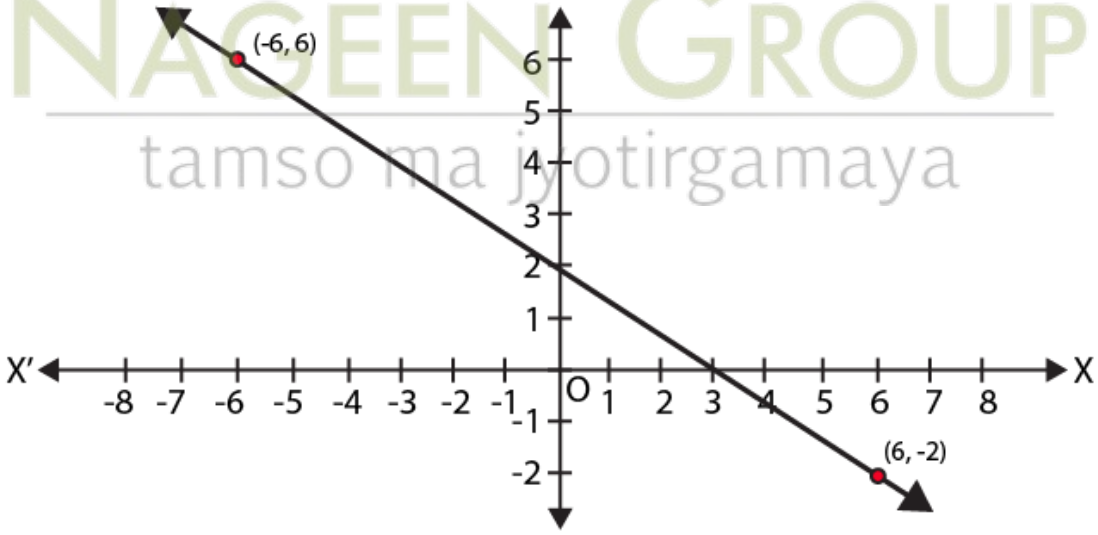
We have the equation,
y = 9x – 7
For A (1, 2),
Substituting the values of (x,y) = (1, 2),
We get,
2 = 9(1) – 7 = 9 – 7 = 2
For B (–1, –16),
Substituting the values of (x,y) = (–1, –16),
We get,
–16 = 9(–1) – 7 = – 9 – 7 = – 16
For C (0, –7),
Substituting the values of (x,y) = (0, –7),
We get,
– 7 = 9(0) – 7 = 0 – 7 = – 7
Hence, we find that the points A (1, 2), B (–1, –16) and C (0, –7) satisfies the line y = 9x – 7.
Hence, A (1, 2), B (–1, –16) and C (0, –7) are solutions of the linear equation y = 9x – 7
Therefore, points A (1, 2), B (–1, –16), C (0, –7) lie on the graph of linear equation y = 9x – 7.

2. The following observed value of x and y are thought to satisfy a linear equation. Write the linear equation-

x	**6**	**– 6**
y	**– 2**	**6**

Draw the graph using the value of x, y as given in the above table. At what points the graph of the linear equation (i) cuts the X-axis ? (ii) cuts the Y-axis?

Solution:



We know that,
The linear equation of a line is,
y = mx + c, where, c is the y-intercept
From the graph,
We get y-intercept is 2.
⇒ c = 2.
Also, from the graph,
We get,
$x_1 = 6$, $y_1 = -2$ and $x_2 = -6$, $y_2 = 6$
We know that,
m = slope of the line

$$\Rightarrow m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\Rightarrow m = \frac{6 - (-2)}{-6 - 6}$$

$$\Rightarrow m = \frac{8}{-12}$$

$$\Rightarrow m = -\frac{2}{3}$$

∴ we get the linear equation,
y = – (2/3)x + 2
Multiplying whole equation by 3, we get,
⇒ 3y = – 2x + 6
⇒ 2x + 3y – 6 = 0

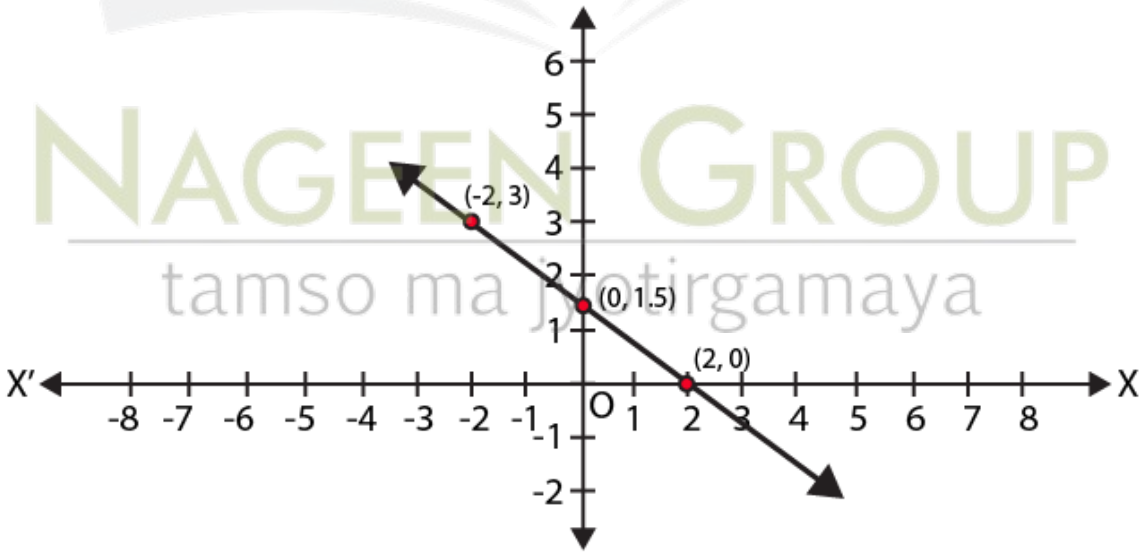
Thus, the points the graph of the linear equation cuts
(i)x-axis
Since, the point is on x axis, we have, y = 0.
Substituting y = 0 in the equation, 2x + 3y – 6 = 0,
We get,
2x + 3×0 – 6 = 0
⇒ 2x = 6
⇒ x = 3
Hence, the point at which the graph cuts x-axis = (3, 0).

(ii) y-axis
Since, the point is on y axis, we have, x = 0.
Substituting x = 0 in the equation, 2x + 3y – 6 = 0,
We get,
2×0 + 3y – 6 = 0
⇒ 3y = 6
⇒ y = 2
Hence, the point at which the graph cuts x-axis = (0, 2).

3. Draw the graph of the linear equation 3x + 4y = 6. At what points, the graph cuts X and Y-axis?
Solution:

According to the question,
We get the equation,
3x + 4y = 6.
We need at least 2 points on the graph to draw the graph of this equation,
Thus, the points the graph cuts
(i) x-axis
Since, the point is on x axis, we have, y = 0.
Substituting y = 0 in the equation, 3x + 4y = 6,
We get,
3x + 4×0 = 6
⇒ 3x = 6
⇒ x = 2
Hence, the point at which the graph cuts x-axis = (2, 0).

(ii) y-axis
Since, the point is on y axis, we have, x = 0.
Substituting x = 0 in the equation, 3x + 4y = 6,
We get,
3×0 + 4y = 6
⇒ 4y = 6
⇒ y = 6/4
⇒ y = 3/2
⇒ y = 1.5
Hence, the point at which the graph cuts x-axis = (0, 1.5).
Plotting the points (0, 1.5) and (2, 0) on the graph.



Chapter 4
Linear Equations in Two Variables
Exercise 4.1

Question 1:

The cost of a notebook is twice the cost of a pen. Write a linear equation in two variables to represent this statement.

(Take the cost of a notebook to be Rs x and that of a pen to be Rs y.)

Answer:

Let the cost of a notebook and a pen be x and y respectively.

Cost of notebook = 2 × Cost of pen

$x = 2y$

$x - 2y = 0$

Question 2:

Express the following linear equations in the form $ax + by + c = 0$ and indicate the values of a, b, c in each case:

(i) $2x+3y=9.35\overline{5}$ (ii) $x-\frac{y}{5}-10=0$ (iii) $-2x + 3y = 6$

(iv) $x = 3y$ (v) $2x = -5y$ (vi) $3x + 2 = 0$

(vii) $y - 2 = 0$ (viii) $5 = 2x$

Answer:

(i) $2x+3y=9.35\overline{5}$

$2x+3y-9.35\overline{5} = 0$

Comparing this equation with $ax + by + c = 0$,

$a = 2, b = 3, c = -9.3\overline{5}$

(ii) $x - \frac{y}{5} - 10 = 0$

Comparing this equation with $ax + by + c = 0$,

$a = 1, b = -\frac{1}{5}, c = -10$

(iii) $-2x + 3y = 6$

$-2x + 3y - 6 = 0$

Comparing this equation with $ax + by + c = 0$,

$a = -2, b = 3, c = -6$

(iv) $x = 3y$

$1x - 3y + 0 = 0$

Comparing this equation with $ax + by + c = 0$,

$a = 1, b = -3, c = 0$

(v) $2x = -5y$

$2x + 5y + 0 = 0$

Comparing this equation with $ax + by + c = 0$,

$a = 2, b = 5, c = 0$

(vi) $3x + 2 = 0$

$3x + 0.y + 2 = 0$

Comparing this equation with $ax + by + c = 0$,

$a = 3, b = 0, c = 2$

(vii) $y - 2 = 0$

$0.x + 1.y - 2 = 0$

Comparing this equation with $ax + by + c = 0$,

$a = 0, b = 1, c = -2$

(viii) $5 = 2x$

$-2x + 0.y + 5 = 0$

Comparing this equation with $ax + by + c = 0$,

$a = -2, b = 0, c = 5$

Exercise 4.2

Question 1:

Which one of the following options is true, and why?

$y = 3x + 5$ has

(i) a unique solution, (ii) only two solutions, (iii) infinitely many solutions

Answer:

$y = 3x + 5$ is a linear equation in two variables and it has infinite possible solutions. As for every value of x, there will be a value of y satisfying the above equation and vice-versa.

Hence, the correct **Answer** is (iii).

Question 2:

Write four solutions for each of the following equations:

(i) $2x + y = 7$ (ii) $\pi x + y = 9$ (iii) $x = 4y$

Answer:

(i) $2x + y = 7$

For $x = 0$,

$2(0) + y = 7$

$\Rightarrow y = 7$

Therefore, (0, 7) is a solution of this equation.

For $x = 1$,

$2(1) + y = 7$

$\Rightarrow y = 5$

Therefore, (1, 5) is a solution of this equation.

For $x = -1$,

$2(-1) + y = 7$

$\Rightarrow y = 9$

Therefore, (−1, 9) is a solution of this equation.

For $x = 2$,

$2(2) + y = 7$

$\Rightarrow y = 3$

Therefore, (2, 3) is a solution of this equation.

(ii) $\pi x + y = 9$

For $x = 0$,

$\pi(0) + y = 9$

$\Rightarrow y = 9$

Therefore, (0, 9) is a solution of this equation.

For $x = 1$,

$\pi(1) + y = 9$

$\Rightarrow y = 9 - \pi$

Therefore, $(1, 9 - \pi)$ is a solution of this equation.

For $x = 2$,

$\pi(2) + y = 9$

$\Rightarrow y = 9 - 2\pi$

Therefore, $(2, 9 - 2\pi)$ is a solution of this equation.

For $x = -1$,

$\pi(-1) + y = 9$

$\Rightarrow y = 9 + \pi$

$\Rightarrow (-1, 9 + \pi)$ is a solution of this equation.

(iii) $x = 4y$

For $x = 0$,

$0 = 4y$

$\Rightarrow y = 0$

Therefore, (0, 0) is a solution of this equation.

For $y = 1$,

$x = 4(1) = 4$

Therefore, (4, 1) is a solution of this equation.

For y = −1,

$x = 4(-1)$

$\Rightarrow x = -4$

Therefore, (−4, −1) is a solution of this equation.

For $x = 2$,

$2 = 4y$

$\Rightarrow y = \frac{2}{4} = \frac{1}{2}$

Therefore, $\left(2, \frac{1}{2}\right)$ is a solution of this equation.

Question 3:

Check which of the following are solutions of the equation $x - 2y = 4$ and which are not:

(i) (0, 2 (ii) (2, 0) (iii) (4, 0)

(iv) $(\sqrt{2}, 4\sqrt{2})$ (v) (1, 1)

Answer:

(i) (0, 2)

Putting $x = 0$ and $y = 2$ in the L.H.S of the given equation,

$x - 2y = 0 - 2\times2 = -4 \neq 4$

L.H.S ≠ R.H.S

Therefore, (0, 2) is not a solution of this equation.

(ii) (2, 0)

Putting $x = 2$ and $y = 0$ in the L.H.S of the given equation,

$x - 2y = 2 - 2 \times 0 = 2 \neq 4$

L.H.S ≠ R.H.S

Therefore, (2, 0) is not a solution of this equation.

(iii) (4, 0)

Putting $x = 4$ and $y = 0$ in the L.H.S of the given equation,

$x - 2y = 4 - 2(0)$

= 4 = R.H.S

Therefore, (4, 0) is a solution of this equation.

(iv) $(\sqrt{2}, 4\sqrt{2})$

Putting

$x = \sqrt{2}$ and $y = 4\sqrt{2}$ in the L.H.S of the given equation,

$$x - 2y = \sqrt{2} - 2\left(4\sqrt{2}\right)$$
$$= \sqrt{2} - 8\sqrt{2} = -7\sqrt{2} \neq 4$$

L.H.S ≠ R.H.S

Therefore, $(\sqrt{2}, 4\sqrt{2})$ is not a solution of this equation.

(v) (1, 1)

Putting $x = 1$ and $y = 1$ in the L.H.S of the given equation,

$x - 2y = 1 - 2(1) = 1 - 2 = -1 \neq 4$

L.H.S ≠ R.H.S

Therefore, (1, 1) is not a solution of this equation.

Question 4:

Find the value of k, if $x = 2$, $y = 1$ is a solution of the equation $2x + 3y = k$.

Answer:

Putting $x = 2$ and $y = 1$ in the given equation,

$2x + 3y = k$

$\Rightarrow 2(2) + 3(1) = k$

$\Rightarrow 4 + 3 = k$

$\Rightarrow k = 7$

Therefore, the value of k is 7.

Class 9th Mathematics

04

LINEAR EQUATION IN TWO VARIABLES

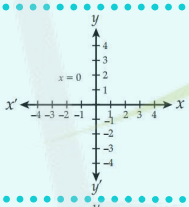
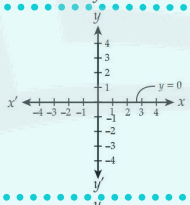
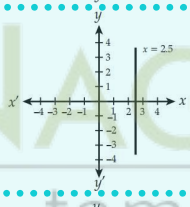
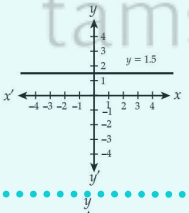
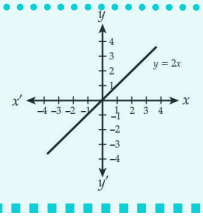
MIND MAP

Linear Equations in Two Variables

Linear equation

- **Where**
  - a , b c - constants
    $(a,b) \neq (0,0)$
- **Equation of the form ax + by + c = 0**
- **Example** → **x, y - variables**

Graphical Representation

Equation	Interpretation	Graphical representation
$x = 0$	Equation of y-axis	
$y = 0$	Equation of x-axis	
$x = K$	Straight line parallel to y-axis	
$y = K$	Straight line parallel to x-axis	
$y = mx$	Line passing through origin	

Steps to find solution

Step 1: Write the equation in two variables, if not present

Step 2: Reduce it to one variable by putting an arbitrary value of any variable, to find a pair of solution.

Step 3: Repeat step 2 for another arbitrary value of variable to find another pair of solution.

It can have one, no or infinitely many solutions.

Example - Graph of Linear Equation

Linear equation: $2x + 3y + 12$

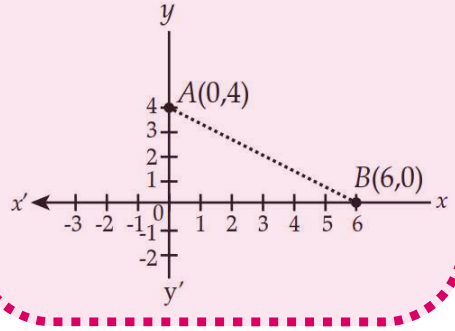
Step 1: From equation, we get

$$y = \frac{12 - 2x}{3}$$

Step 2: Put arbitrary value of x, y.

x	0	0
y	4	6

Step 3: Plot (0,4) and (6,0) on the graph and join them.



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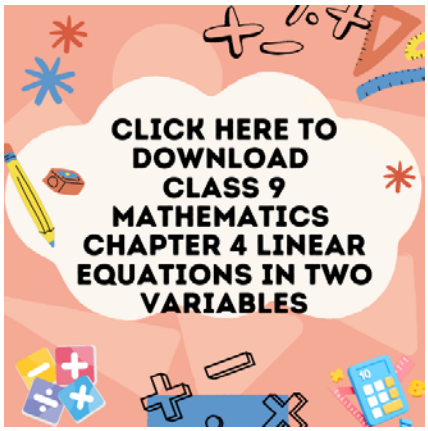

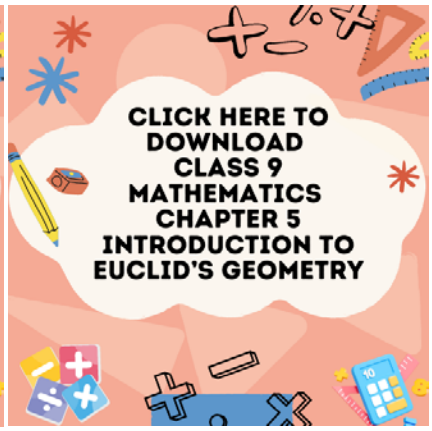

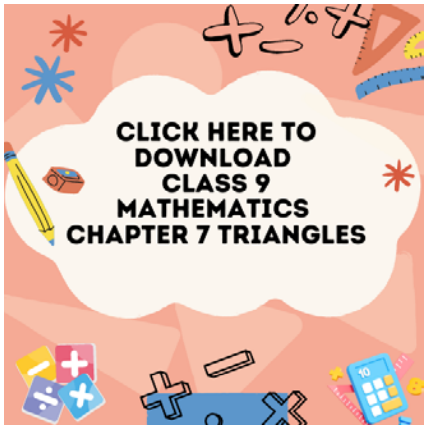

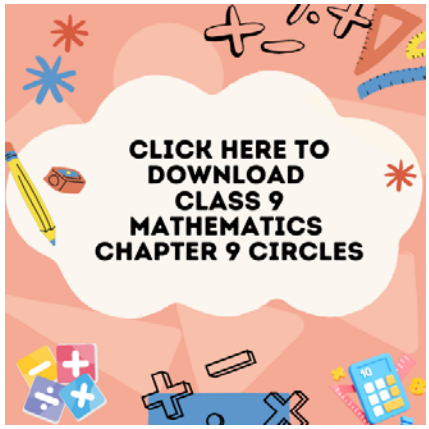

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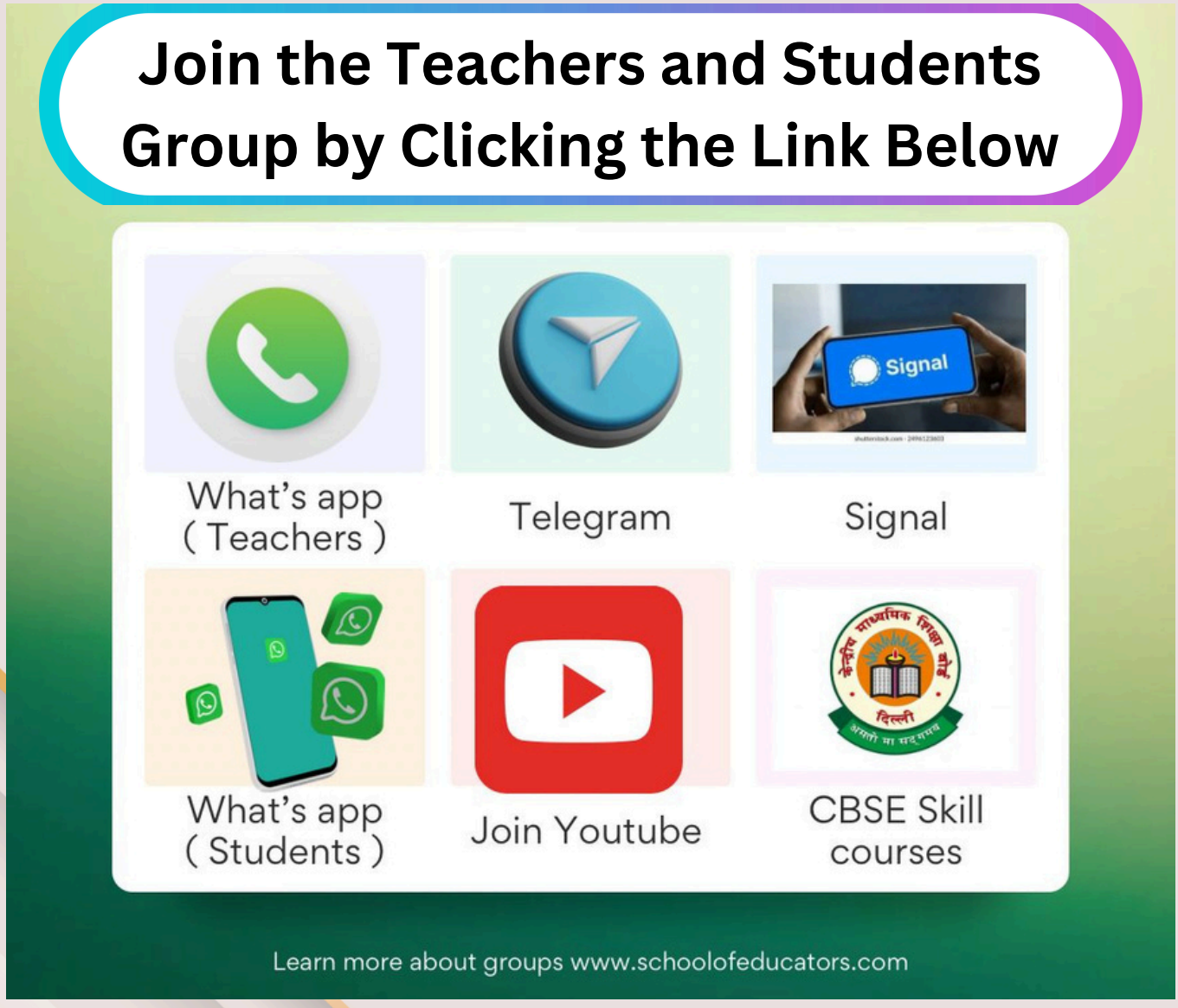

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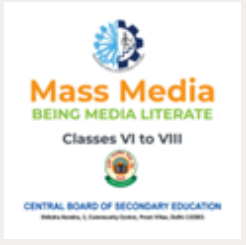

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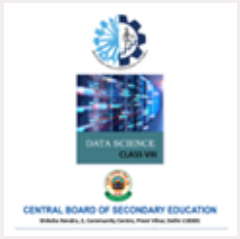

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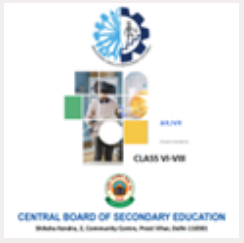

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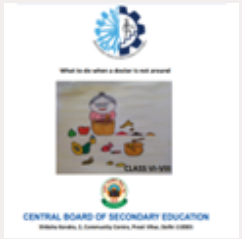

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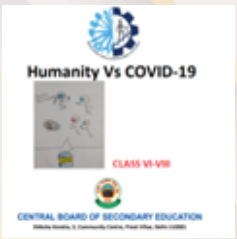
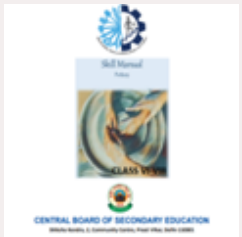


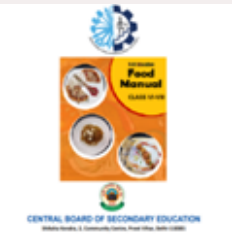
Humanity & Covid-19

Blue Pottery

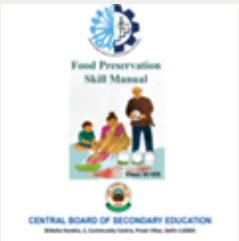


Pottery

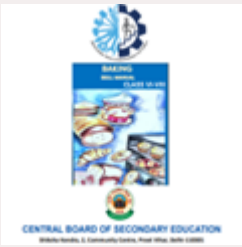
Block Printing



Food



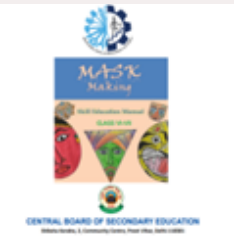
Food Preservation



Baking

Herbal Heritage

Khadi



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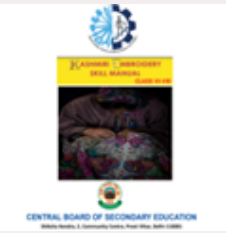
Mass Media

Making of a Graphic Novel



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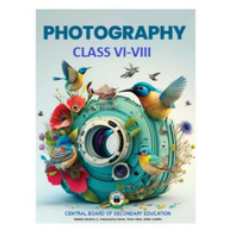
Embroidery

Rockets

Satellites

Application of Satellites



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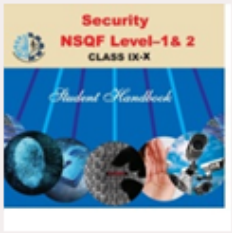
Retail

Information Technology



Security

Automotive

Introduction To Financial Markets

Introduction To Tourism

Beauty & Wellness

Agriculture

Food Production

Front Office Operations

Banking & Insurance

Marketing & Sales

Health Care

Apparel

Multi Media

Multi Skill Foundation Course

Artificial Intelligence

Physical Activity Trainer

Data Science

Electronics & Hardware (NEW)

Foundation Skills For Sciences (Pharmaceutical & Biotechnology)(NEW)

Design Thinking & Innovation (NEW)

SKILL SUBJECTS AT SR. SEC. LEVEL (CLASSES XI – XII)

Retail

InformationTechnology

Web Application

Automotive

Financial Markets Management

Tourism

Beauty & Wellness

Agriculture

Food Production

Front Office Operations

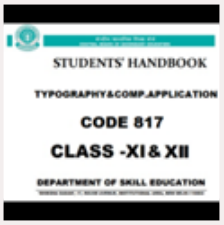
Banking

Marketing

Health Care

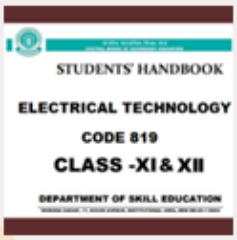
Insurance

Horticulture



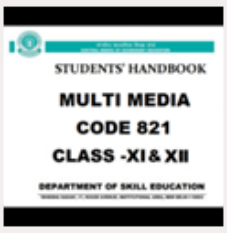
Typography & Comp. Application

Geospatial Technology



Electrical Technology

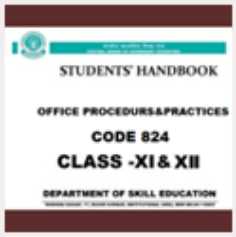
Electronic Technology



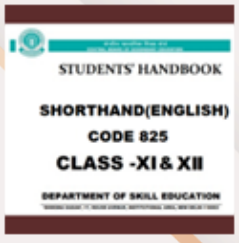
Multi-Media

Taxation

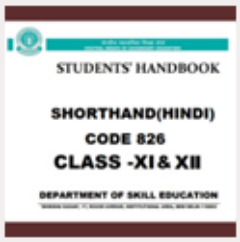
Cost Accounting



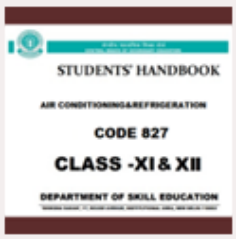
Office Procedures & Practices



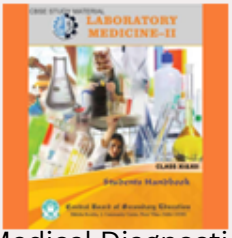
Shorthand (English)



Shorthand (Hindi)



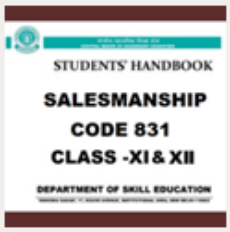
Air-Conditioning & Refrigeration



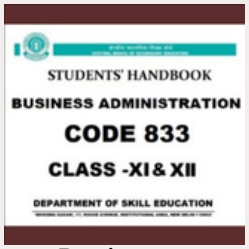
Medical Diagnostics

Textile Design

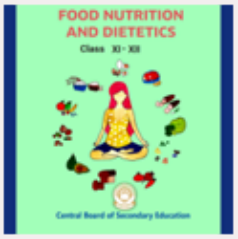
Design



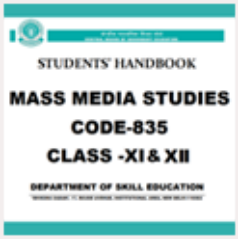
Salesmanship



Business Administration



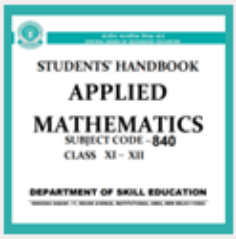
Food Nutrition & Dietetics



Mass Media Studies

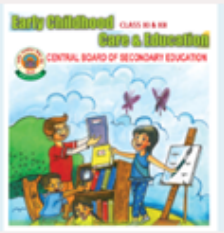
Library & Information Science

Fashion Studies



Applied Mathematics

Yoga

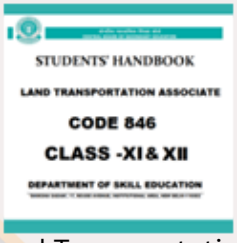


Early Childhood Care & Education

Artificial Intelligence

Data Science

Physical Activity Trainer(new)



Land Transportation Associate (NEW)

Electronics & Hardware (NEW)

Design Thinking & Innovation (NEW)

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Hindi-B

IT Code-402

IT

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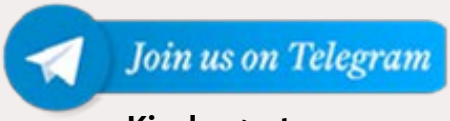
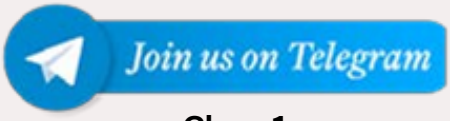
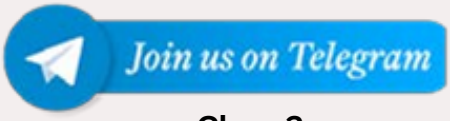


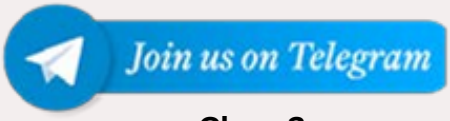
Kindergarten



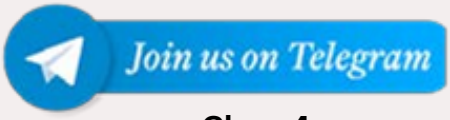
Class 1



Class 2



Class 3



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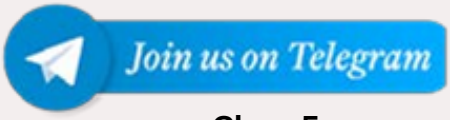
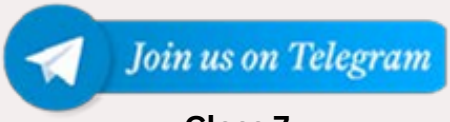
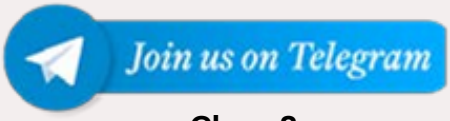


Class 5

Class 6



Class 7



Class 8

Class 9

Class 10

Class 11 (Sci)

Class 11 (Com)

Class 11 (Hum)

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